Undergraduate Origins of Recent (1991-95) Science and Engineering Doctorate Recipients

Special Report

Division of Science Resources Studies
Directorate for Social, Behavioral and Economic Sciences

National Science Foundation

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FOREWORD

Baccalaureate institutions are an essential part of the educational process for persons earning science and engineering (S&E) doctorates. This report summarizes data on the baccalaureate institutions reported by persons completing doctorates from 1991 through 1995. It provides an institutional context for examining this aspect of the educational pipeline.

Jeanne E. Griffith
Director
Division of
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December 1996

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INTRODUCTION

Currently, only about 325 universities in the United States provide doctorate-level education in science and engineering (S&E), but other institutions provide students their foundation in science or engineering:

- Almost 2,200 4-year colleges that offer undergraduate S&E degrees;
- About 1,400 2-year schools that offer S&E instruction and/or training in S&E technologies;
- Over 23,000 high schools that provide mathematics and science courses; and
- Numerous high schools, colleges, and universities in foreign countries that educate the many students who came to the United States for their graduate degrees.[1]

Given their significance, these institutions have been studied and reported on for over 50 years (see appendix C, Bibliography).[2] This report provides additional knowledge, focusing particularly on those institutions that awarded baccalaureates to students who later received doctorates in S&E fields.

OVERVIEW

Because undergraduate education is the foundation for graduate studies, it is important to know where our Nation's S&E doctorate recipients are receiving their undergraduate training. Specifically, this report addresses the following broad questions:

- What are the undergraduate origins of S&E doctorate holders? What role do foreign institutions play?
- Which educational institutions contribute most to the undergraduate education of recent S&E doctorate recipients?
- What proportion of S&E doctorate holders had earned their baccalaureate at a doctorate granting institution?
- What roles do the various types of baccalaureate origin institutions play in S&E predoctorate education?
- What role do 2-year colleges play in the undergraduate education of persons who later earn an S&E doctorate?
- Are the top-ranking baccalaureate institutions of women and racial/ethnic minorities the same as those of men and whites?

These and related questions are explored in this report.

DEFINITIONS

Recent doctorate recipients are defined as persons who earned doctorates in S&E fields from U.S. universities in the academic years ending in June 1991 through 1995. Doctorate recipients in these five years were combined into one cohort, or unit of analysis, to minimize the possibility of overemphasizing any unusual circumstances from any single year.

The **S&E fields of study**, as defined by the National Science Foundation (NSF), include the natural sciences (physical sciences, biological sciences, mathematics, computer sciences), social science/psychology, and engineering. The specific fields are listed in table 1 in Appendix B, Detailed Statistical Tables. Note that engineering technology and medical degrees are not included.

[1] Data on numbers of institutions are from the National Center for Education Statistics, Digest of Education Statistics 1995 (Washington, D. C.: Supt. of Documents, U.S. Government Printing Office, 1995) p. 14.

[2] Many of the reports cited in the Bibliography focus on the "productivity" of baccalaureate institutions (i.e., the proportion of the total bachelor's degree recipients from that institution, or group of institutions, who go on to earn doctorates within a certain time frame). This approach adjusts for institutional size to some extent.

A **baccalaureate-origin institution** is defined as the college or university from which an S&E doctorate recipient had earned a bachelor's degree. Excluded are any other undergraduate institutions that the student may have attended before receiving a baccalaureate.

The **Carnegie Classification of Institutions** was used to group types of institutions for this analysis. The Carnegie Commission on Higher Education has periodically (1970, 1976, 1987, and 1994) classified institutions of higher education in the United States by the range of programs and/or degrees offered, enrollment size, and amount of Federal funds received for research. The 1994 Carnegie Classification is used in this report to study the baccalaureate origins of scientists and engineers who recently received their doctorate from U.S. institutions. The changes to the 1994 Carnegie Classification were such that this analysis is not comparable to the earlier data by Carnegie Classifications in the earlier report, Undergraduate Origins of Recent Science and Engineering Doctorate Recipients (NSF 92-332). See Appendix A, Technical Notes, for more detailed information.

Source of Data

The source of the data used in this report is the Survey of Earned Doctorates (SED), awarded in the United States. The survey questionnaires are completed by approximately 94 to 95 percent of all doctorate recipients as they finish the requirements for their degree. A detailed description of the survey and possible sources of error are provided in Appendix A, Technical Notes.

Undergraduate Origins in Foreign Institutions

Most recipients of S&E doctorates from U.S. universities also receive their undergraduate education at U.S. institutions. Foreign institutions do, however, play a significant role. Therefore, at the beginning of this section, brief consideration is given to the extent to which foreign institutions have provided the undergraduate education of S&E doctorate recipients. Baccalaureate origins in U.S. institutions are then treated in more detail.

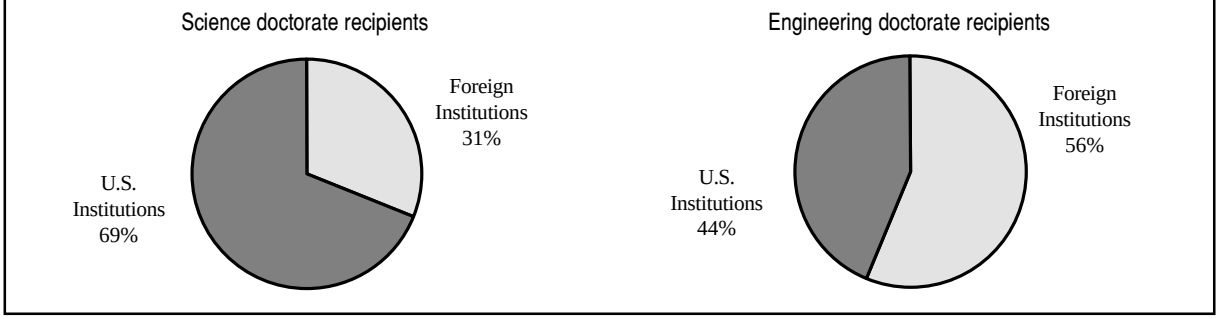
Universities in the United States and other major Western nations house advanced training facilities and employ distinguished scholars. Consequently, many students from foreign countries come to the United States to obtain graduate S&E training. In 1995, 40 percent of all S&E doctorate recipients from U.S. universities were citizens of foreign countries; a decade earlier, the comparable figure was 27 percent.[3] Given the growing international nature of the scientific and technological community, it is not surprising that over one-third of all recipients of S&E doctorates awarded by U.S. universities had received their baccalaureates from foreign institutions.

Role of Foreign Institutions by S&E Field

Considerably more **engineering** doctorate holders received their undergraduate education in foreign institutions than did **science** doctorate holders: 56 percent versus 31 percent (chart 1). In several science fields, however, the proportion of foreign baccalaureate holders was significantly higher than the average: Mathematics (52 percent), computer science (49 percent), agriculture (48 percent), physics (43 percent), chemistry (37 percent), and social science (35 percent) (table 1).

[3] Susan T. Hill, "Non-U.S. Citizens Were 40 Percent of S&E Doctorate Recipients from U.S. Universities in 1995" (Arlington, VA.: National Science Foundation, 1996), NSF 96-315, p.1. More detailed data are also available in: Susan T. Hill, *Selected Data on Science and Engineering Doctorates: 1995* (Arlington, VA.: National Science Foundation, 1996), NSF 96-303.

Chart 1. U.S. versus foreign baccalaureate origins of recent science and engineering doctorate recipients



SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

Foreign Citizen Scientists and Engineers (S&Es) Who Earned Both Baccalaureate and Doctorate in the United States

Most foreign citizens who earned S&E doctorates in the United States completed the lower levels of education in their native countries. Some foreign S&E doctorate holders, however, had received not only their doctorate in the United States, but also their baccalaureate. As would be expected, a higher proportion of foreign S&E doctorate recipients with permanent resident visas than with temporary visas (17 versus 7 percent) had earned their baccalaureate in U.S. institutions.

Among foreign citizens who received their S&E doctorate in the United States, those of certain countries had high proportions who also earned their baccalaureate in the United States. Iran, the Caribbean Islands, (West) Germany, Hong Kong, Japan, Lebanon, and Nigeria had high proportions of S&E doctorates who received all of their college education (baccalaureate through doctorate) in the United States (table 2 in Appendix B). Reasons for those high proportions vary by country and include foreign government programs promoting mobility as well as the unavailability of comparable programs in the home countries.

Special tabulations for 1994 Ph.D. recipients provide a picture of the foreign **institutions** that play a prominent role in the baccalaureate education of foreign citizens who came to the United States to earn a research doctorate. The top 25 foreign institutions with large numbers of graduates who went on to earn a doctorate in the U.S. are shown in table 20 in Appendix B. All of these top universities are in (the People's Republic of) China, India, Korea, or Taiwan. Together these top 25 institutions accounted for 31 percent of the baccalaureate-origins of 1994 foreign Ph.D. recipients in S&E.[5]

[4] Robert Morgan and Elinor Barber, *Boon or Bane* (New York: Institute for International Education, 1988).

[5] For a list of all baccalaureate-origin institutions in foreign countries of 1994 S&E doctorate recipients, see table 19 in Appendix B.

IMPACT OF FOREIGN STUDENTS

In graduate schools of engineering, faculty often teach students who have been educated outside the United States. What is the impact of large numbers of students from foreign countries in the classroom? A recent report, Boon or Bane, determined that faculty "did not to any great extent take the national composition of their graduate students into account in defining the content of the subject matter to be taught." The authors reported that the baccalaureate educational background of foreign students "provides in many instances a high level of theoretical sophistication." In terms of communication, however, almost half of faculty reported they had "made special efforts to accommodate the foreign students' difficulties in oral comprehension."[4]

Undergraduate Origins by Type of U.S. Institution

Recent S&E doctorate recipients cited over 1,400 U.S. institutions as the sources of their baccalaureates. These institutions constitute almost three-quarters of the Nation's approximately 2,200 colleges and universities that award bachelor's degrees.

Nationally Prominent Institutions from Which S&E Doctorate Recipients Had Received Baccalaureate Education

Twenty-five U.S. institutions were especially prominent among those that granted baccalaureates to students who eventually earned their S&E doctorate. Together, the 25 institutions accounted for the baccalaureate education of one-quarter of those persons who received S&E doctorates in the United States between 1991 and 1995 (table 3). Individually, each of the 25 top-ranked institutions had provided the undergraduate education of at least 500 graduate students who received their S&E doctorate in that period.

The University of California at Berkeley was by far the largest provider of U.S. undergraduate education of recent S&E doctorate recipients, followed by University of Illinois at Urbana, Cornell University, and University of Michigan (table 3).

All institutions that provided the baccalaureate education of 10 or more recent S&E doctorates are listed in Appendix B, table 18.

Carnegie Classification of U.S. Institutions by S&E Field of Study

The 1994 Carnegie Classification system was used in this report whereby the 4-year institutions in the United States that awarded baccalaureates were grouped into the following categories:

- Research universities (number=125),
- Doctoral universities (number=111),
- Master's colleges and universities (number=529),
- Baccalaureate colleges (number=637), and
- Specialized institutions (number=690)

Appendix A, Technical Notes, provides detailed information on these Carnegie Classification groups.

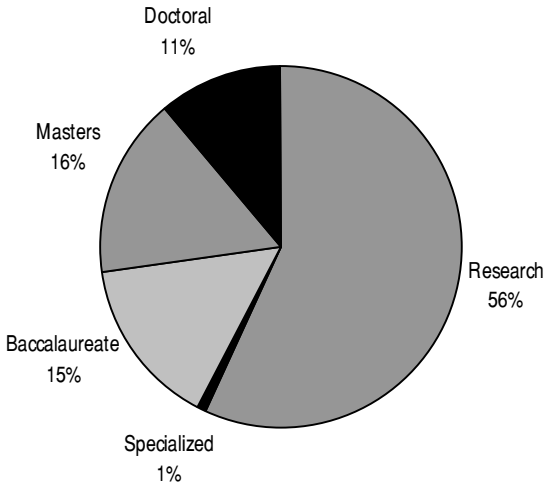
Table 4 provides an overview of the role of each type of Carnegie Classification group in the baccalaureate-origins of S&E doctorate recipients from 1991 to 1995, by field of study. The 125 research universities awarded 56 percent of the bachelor's degrees of S&E doctorate recipients, and the 111 doctoral universities awarded another 11 percent. Altogether the 236 institutions (research plus doctoral universities categories) that offer doctoral S&E programs accounted for 67 percent of the **baccalaureate origins** of S&E doctorate holders (chart 2). This is somewhat higher than the proportion of S&E **bachelor's degrees** awarded (54 percent) that doctorate-granting institutions accounted for in 1993.[6]

The role of each Carnegie group in the baccalaureate-origins of recent S&E doctorate holders differed markedly depending on the S&E field of doctorate awarded.[7] For example, research universities provided

[6] National Science Board, *Science and Engineering Indicators—1996.* (Arlington, VA: U.S. Government Printing Office, 1996, NSB 96-21), 2-9 and 2-10.

[7] Note that field of study refers only to the field of the doctorate. Changes in field of study from the baccalaureate to the doctorate do occur; see Susan T. Hill, *Science and Engineering Doctorates: 1960-90* (Washington, D.C.: National Science Foundation, 1991), pp. 165-66.

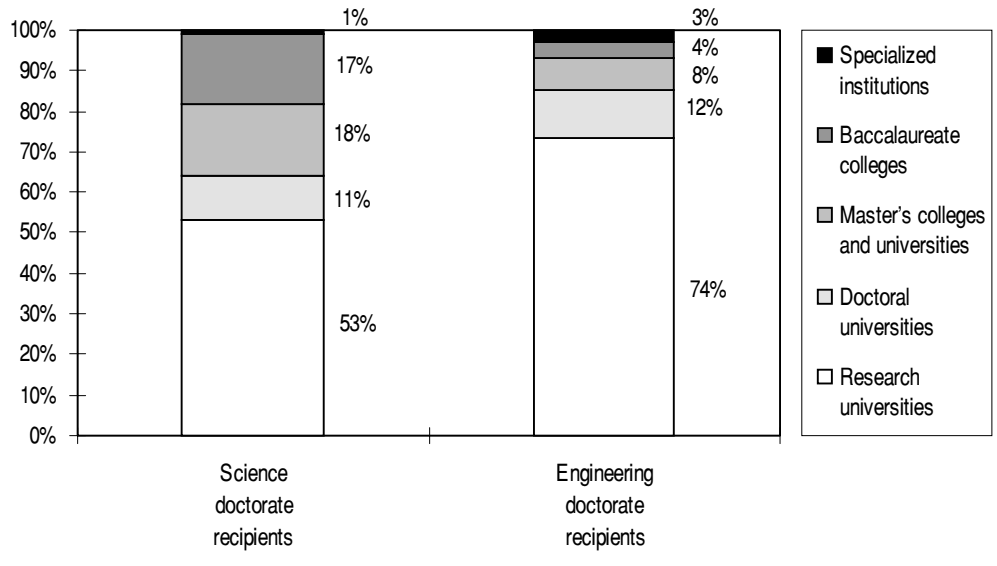
Chart 2. Baccalaureate origins in U.S. institutions of total recent science and engineering doctorate recipients, by Carnegie Classification of Institutions



NOTES: See Technical Notes for more information on the Carnegie Classification. Percentages may not add to 100 due to rounding.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

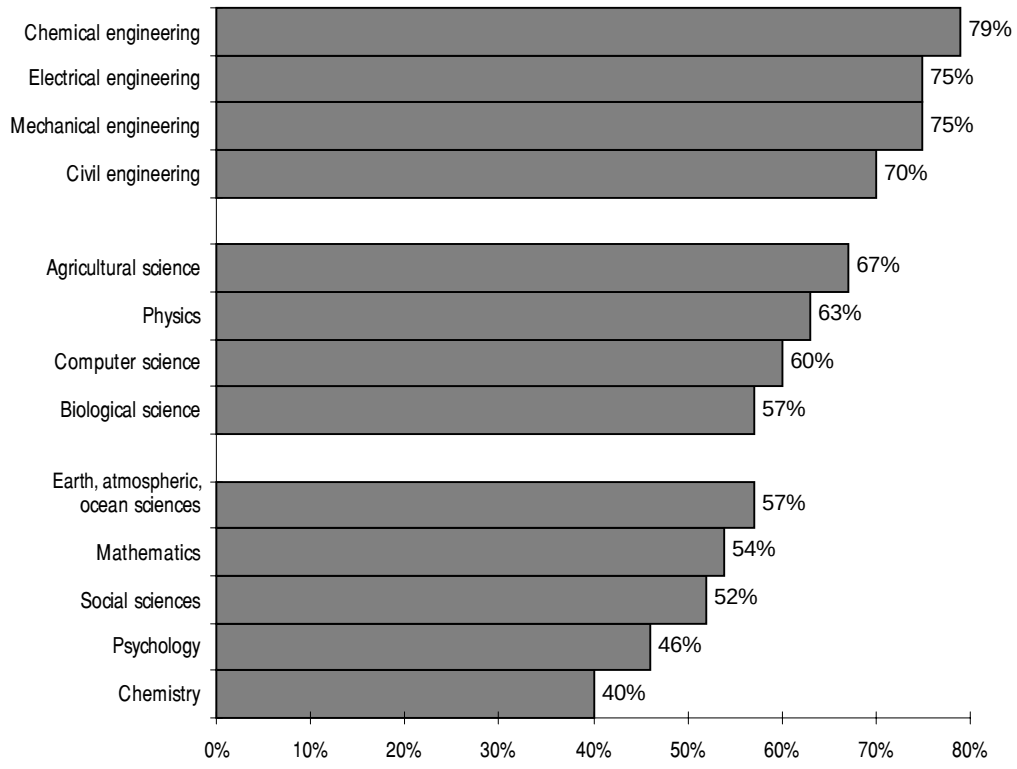
Chart 3. Baccalaureate origins in U.S. institutions of recent science and engineering doctorate recipients, by Carnegie Classification of Institutions



NOTES: See Technical Notes for more information on the Carnegie Classification. Percentages may not add to 100 due to rounding.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

Chart 4. Percent of recent science and engineering doctorate recipients who earned their bachelor's degrees at U.S. research universities, by field of doctorate



NOTE: See Technical Notes for more information on the Carnegie Classification.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

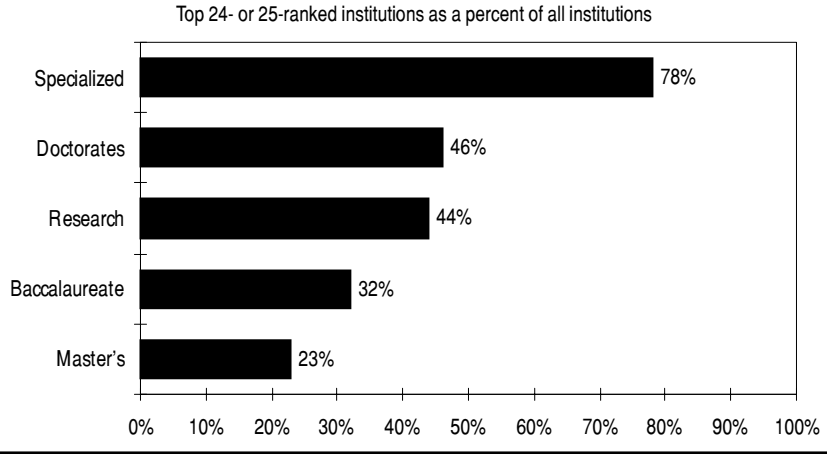
the undergraduate education of about three-fourths of the recent doctorate recipients in chemical, electrical, and mechanical engineering. But these institutions awarded baccalaureates to only 40 percent of recent chemistry doctorate recipients, who tended to have their baccalaureate origins in master's and baccalaureate institutions (table 4).

The following sections describe baccalaureate origins for S&E doctorates for each of the five kinds of institutions. A list of the top 25 (or 24, depending on an even break-point for number of degrees) institutions within each Carnegie Classification group is also provided. The role of 2-year institutions is also discussed.

Role of Research Universities in the Baccalaureate Education of S&E Doctorate Recipients

The 125 "research universities" led other institutions both in the amount of Federal support received for research and in the range of doctoral programs offered. Research universities played a central role in undergraduate S&E education, having provided the baccalaureate education of 56 percent of recent S&E doctorate holders.

Chart 5. Concentration of baccalaureate-origin institutions of recent science and engineering doctorate recipients within each Carnegie Classification of Institutions



NOTE: See Technical Notes for more information on the Carnegie Classification.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

Three-fourths of recent engineering doctorate recipients had earned their bachelor's degree at research universities; the comparable figure for science doctorate recipients was about half. Scientists with recently acquired doctorates were more likely than their engineering counterparts to have earned their bachelor's degrees at master's or baccalaureate institutions (chart 3). The prominence of research universities varied by field, however, as shown in chart 4.

Of the 25 top-ranked baccalaureate institutions from which S&E doctorate holders had earned their baccalaureate (table 3), all were classified as research universities. The top 25 research universities do NOT differ from the general ranking of top 25 baccalaureate institutions nationally. Table 5 lists the top 25 research universities; together, these accounted for about 44 percent of the bachelor's degrees earned at the 125 research universities by recent S&E doctorate recipients (chart 5).

Role of Doctoral Universities in the Baccalaureate Education of S&E Doctorate Recipients

The 111 "doctoral universities" have established doctoral programs, but have fewer research programs than research-intensive institutions. Schools categorized as doctoral universities accounted for 11 percent of the baccalaureate-origins of recent S&E doctorate recipients.

The top 25 doctoral universities awarded 46 percent of the category's total S&E doctorate holders' baccalaureates (table 6).

Role of Master's Colleges and Universities in the Baccalaureate Education of S&E Doctorate Recipients

Institutions identified as "master's colleges and universities" are those that offer a liberal arts program, a professional or occupational program, and master's degrees. This category includes 529 institutions that award S&E baccalaureates.

The top 25 master's colleges and universities are dominated by the California State university system and the New York City university system, which together accounted for 12 of the top 25. The top 25 institutions awarded almost one-fourth of the S&E baccalaureates to those who later became S&E doctorate recipients (table 7).

Master's colleges and universities had conferred baccalaureates on almost 2 out of every 10 recent science doctorate recipients, twice the proportion found among recent engineering doctorate recipients (chart 3).

Role of Baccalaureate Colleges in the Baccalaureate Education of S&E Doctorate Recipients

Baccalaureate colleges are predominantly bachelor's degree-granting institutions that award more than half their degrees in liberal arts fields.

The top 25 baccalaureate colleges cited most often by recent S&E doctorate holders as their baccalaureate-origin institutions (table 8) account for 32 percent of the total number of bachelor's degrees awarded by baccalaureate institutions to those who went on to earn a doctorate.

When productivity is taken into account, several liberal arts colleges rank with research-intensive universities for number of bachelor's degree recipients who go on to earn a S&E doctorate. One report indicated that 15 of the top 25 institutions—ranked by the proportion of the baccalaureate recipients who earned doctorates in the sciences between 1951 and 1980—were liberal arts colleges.[8] Similar findings were also presented in a report on "Persistence in Higher S&E Education."[9]

By field, baccalaureate colleges provided the baccalaureate education of 15 percent of science doctorate holders, almost four times the proportion found among engineering doctorate holders (chart 3). These institutions play a significant role in the baccalaureate origins of recent doctorate recipients in chemistry, mathematics, social sciences, psychology and biological sciences (table 4).

Role of Specialized Institutions in the Baccalaureate Education of S&E Doctorate Recipients

The Nation's specialized schools cited as baccalaureate origins by S&E doctorate holders are primarily engineering or technical schools. The top 24 of these institutions granted 78 percent of the baccalaureate degrees earned by recent S&E doctorate recipients in schools of this type.

Harvey Mudd College in California headed the list of prominent specialized institutions, followed by three U.S. academies—the U.S. Military, U.S. Air Force, and U.S. Naval Academies (table 9). In terms of **S&E field,** the technical nature of specialized institutions is such that engineering doctorate holders were more likely than science doctorate holders to have attended this type of school for their undergraduate education (chart 3).

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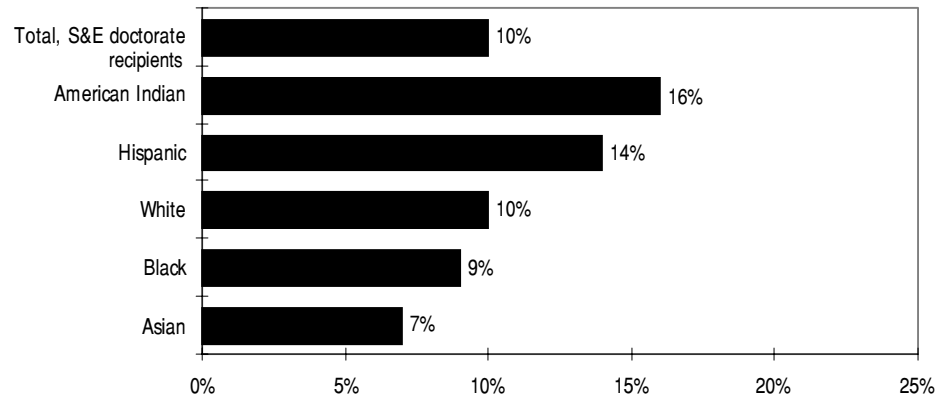
[8] Sam Carrier and David Davis-Van Atta, *Maintaining America's Scientific Productivity* (Oberlin, OH: Oberlin College, 1987).

[9] Betty Maxfield, *Persistence in Higher Science and Engineering S&E Education: S&E Baccalaureate to S&E Doctorate Production* (Washington, D.C.: Library of Congress, Office of Technology Assessment, 1988).

Chart 6. Percent of science and engineering doctorates who attended a 2-year college, by race/ethnicity



SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

Role of 2-year Colleges in the Undergraduate Education of S&E Doctorate Recipients

A key difference between white S&E doctorate holders versus doctorate recipients from some underrepresented minority groups is the latter's attendance at 2-year colleges. In general, Hispanics and American Indians are more likely than other groups to begin their undergraduate education in 2-year colleges.[10] Specifically, 16 percent of American Indian S&E doctorate holders had attended a 2-year college as had 14 percent of Hispanics (chart 6). In comparison, around one-tenth of both black and white S&E doctorate holders had attended a 2-year school; only 7 percent of Asians had done so. These figures may indicate that 2-year colleges are a significant part of the educational pipeline leading to an S&E doctorate for American Indians and Hispanics.

Attendance at 2-year colleges was more pronounced in certain fields of study. Recent recipients of doctorates in agriculture and psychology were more likely to have gone to 2-year colleges than were majors in other S&E fields (table 10).

[10] National Center for Education Statistics, *Trends in Minority Enrollment in Higher Education, Fall 1978 - Fall 1988*, (Washington, D. C.: June 1990).

Baccalaureate Origins of Women and Racial/Ethnic Groups with Doctorates in S&E

Women and racial/ethnic minority groups have different patterns of baccalaureate origins than other S&E doctorate holders. In general, the research universities play less of a role and the other types of institutions play a greater role in their baccalaureate education.

Baccalaureate Origins of Women S&E Doctorate Recipients

Women—who account for approximately one-third of all recent S&E doctorate holders[11]—were less likely than male S&E doctorate holders to earn their baccalaureates at research universities (table 11). On the other hand, women who earned their science doctorates were more likely than men to have had their undergraduate education in baccalaureate colleges (chart 7).

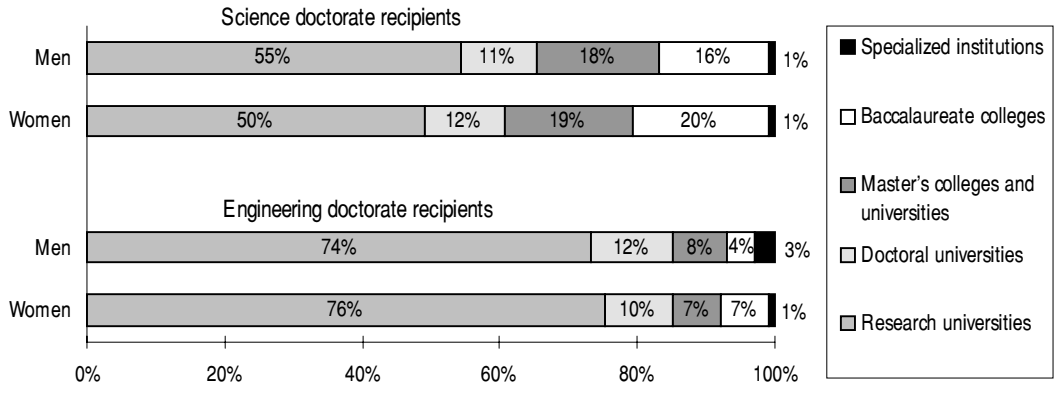
[11] Susan T. Hill, *Selected Data on Science and Engineering Doctorates: 1995* (Arlington, VA.: National Science Foundation, 1996) NSF 96-306, pp. 6-10.

Women's **25 top-ranked baccalaureate colleges** differed somewhat from the 25 institutions cited by all S&E doctorates. Specifically, four of the institutions on the women's list were not found on the general ranking: Brown University, Duke University, Yale University, and University of Colorado at Boulder (table 12).

Baccalaureate-Origins by Racial/Ethnic Group of Recent S&E Doctorate Recipients

Striking differences frequently emerge in the patterns of baccalaureate origins of white S&E doctorate holders compared with their counterparts in other racial/ethnic groups[12] (charts 8 and 9). For example, Asians were much more likely than whites to have received their undergraduate degrees at research universities, and black S&E doctorate holders were less likely than whites to have attended research universities (table 13).

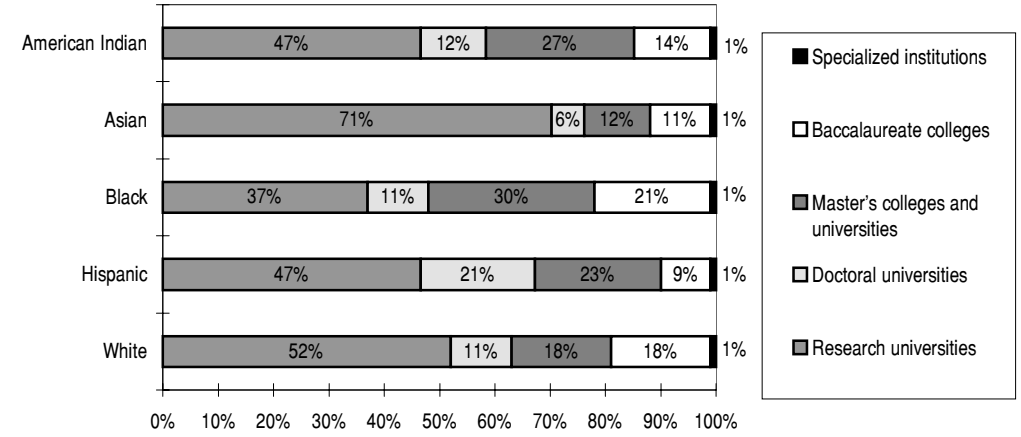
Chart 7. Baccalaureate origins of recent science and engineering doctorate recipients in U.S. institutions, by sex and Carnegie Classification of Institutions



NOTES: See Technical Notes for more information on the Carnegie Classification. Percentages may not add to 100 due to rounding.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

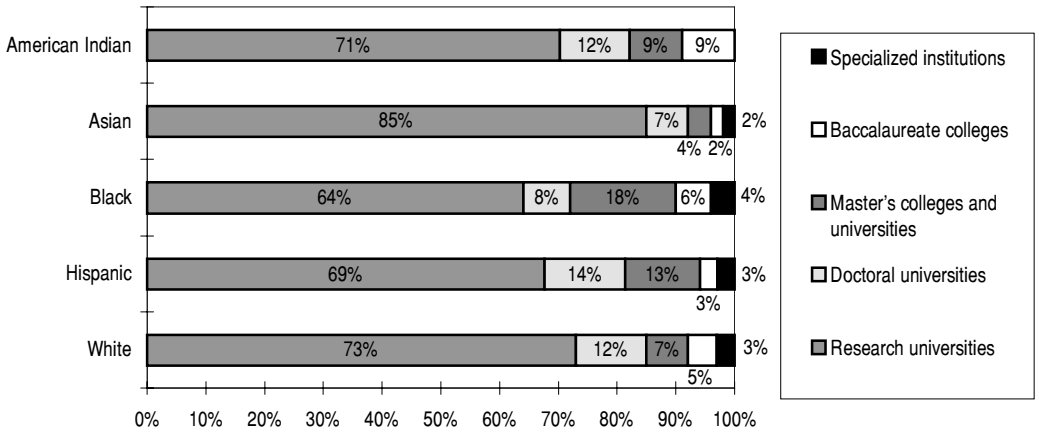
Chart 8. Baccalaureate origins of recent science doctorate recipients in U.S. institutions, by race/ethnicity and Carnegie Classification of Institutions



NOTES: See Technical Notes for more information on the Carnegie Classification. Percentages may not add to 100 due to rounding.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

Chart 9. Baccalaureate origins of recent engineering doctorate recipients in U.S. institutions, by race/ethnicity and Carnegie Classification of Institutions



NOTES: See Technical Notes for more information on the Carnegie Classification. Percentages may not add to 100 due to rounding.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.

In terms of the types of institutions providing S&E undergraduate education, the pattern for black and Hispanic doctorate holders differed from that of other racial/ethnic groups. Master's institutions played a much greater role than the other types of institutions in the undergraduate education of blacks and Hispanics in both science and engineering.

In comparing the top 25 baccalaureate institutions cited by all S&E doctorate holders with those cited by S&E doctorate holders from **underrepresented racial/ethnic groups**,[13] several interesting differences come to light.

The list of the prominent baccalaureate-origin institutions cited by **Hispanic** S&E doctorate holders differed greatly from the list for all S&E doctorate holders. Many of the Hispanic S&E doctorates received their baccalaureates from four Puerto Rican universities (table 14). Also, significant numbers of institutions cited by the Hispanics were located in California, Florida, New Mexico, and Texas, as would be expected given the geographic concentrations of U.S. Hispanic populations.[14] Tables 14a-c show the baccalaureate-origin institutions of Mexican-Americans, Puerto Ricans, and other Hispanics separately.

Because of the small number of **American Indian** S&E doctorate holders, the list of their prominent baccalaureate-origin institutions includes the top 20 colleges and universities that produced three or more baccalaureates who went on to earn an S&E doctorate (table 15). Only six of these 20 institutions were also on the list of top baccalaureate-origins of all S&E doctorate holders. The differences in institutions cited by American Indian versus all S&E doctorate holders reflect to a certain extent the geographic concentrations of American Indian populations.

The top 26 baccalaureate-origin institutions for **black** S&E doctorate holders deviated significantly from the general top 25 list (table 16). Specifically, 12 of the top 26 baccalaureate institutions for black S&E doctorates were historically black colleges and universities (HBCUs).

Role of Historically Black Colleges and Universities (HBCUs) in the Baccalaureate Education of Black S&E Doctorate Recipients

The HBCUs were originally established under legal segregation for the purpose of educating blacks. These institutions were significant in the baccalaureate education of black S&E doctorate holders.[15] S&E bachelors degrees are awarded by 81 HBCUs, most of which are classified as master's or baccalaureate institutions. In all, HBCUs accounted for almost 27 percent of the baccalaureate origins of recent black S&E doctorate recipients. HBCUs were of particular significance in providing the baccalaureate origins of black doctorate recipients in natural science fields[16] (chart 10).

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[12] Carol Fuller, *Baccalaureate Sources of 1975-1986 Doctorates Earned by American Indian, Asian, Black, Hispanic and White Men and Women Adjusted for Institutional Size* (Ann Arbor, MI: Great Lakes Colleges Association, 1989) and Norean Radke Sharpe and Carol H. Fuller, "Baccalaureate Origins of Women Physical Science Doctorates: Relationship to Institutional Gender and Science Discipline," *Journal of Women and Minorities in Science and Engineering*, vol. 2, pp. 1-15, 1995.

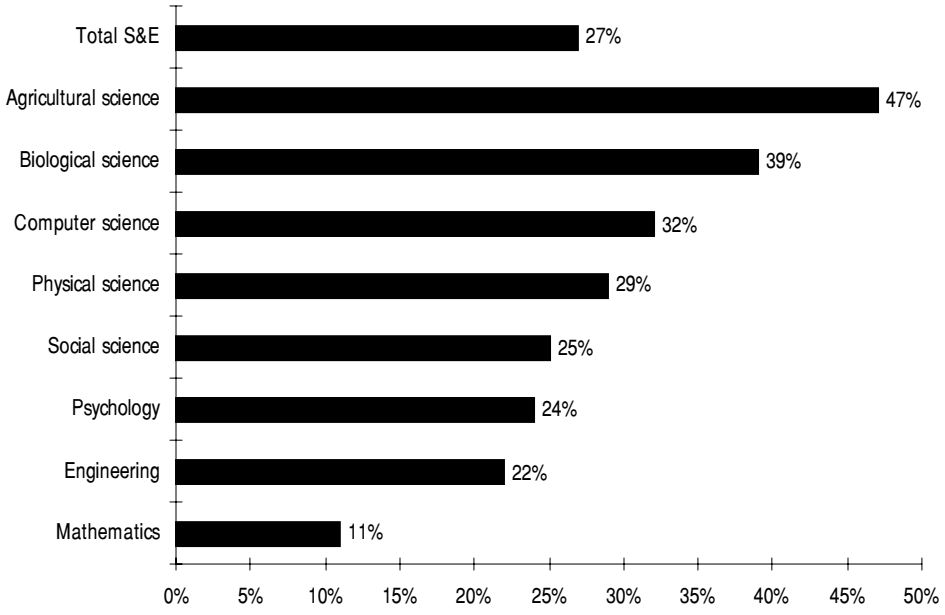
[13] The following analysis of underrepresented racial/ethnic groups has been limited to U.S. citizen S&E doctorate holders who were Black, Hispanic, or American Indian.

[14] Daniel Solorzano, "The Baccalaureate Origins of Chicana and Chicano Doctorates in the Physical, Life, and Engineering Sciences: 1980-1990," *Journal of Women and Minorities*, Vol. 1, No. 4, p. 25.

[15] John T. Hill and Susan T. Hill, "The Role of HBCUs in the Education of Black Scientists and Engineers," paper presented at the 1991 Conference on Blacks in Higher Education (Washington, D. C., 1991).

[16] Cheryl Leggon and Willie Pearson, Jr., "The Baccalaureate Origins of African American Female Ph.D. Scientists," paper presented at the 1993 Conference of the American Association for the Advancement of Science (Boston, MA, 1993).

Chart 10. Black U.S.-citizen S&E doctorate recipients with baccalaureate origins in historically black colleges and universities, by broad science and engineering fields



S&E: science and engineering

NOTE: HBCUs are the 90 historically black colleges and universities that award baccalaureates in S&E fields.

SOURCE: National Science Foundation/SRS, Survey of Earned Doctorates for the years 1991-95.